check and the following gas span check may be combined into one operation.

(2) *Gas span check.* Within one week of the test, the analyzers shall have been spanned using calibration gases which meet the requirements in paragraph (d)(4) of this section and shall not have been readjusted since to a non-conforming gas. If the analyzer reads the span gas within 2% of the span gas value or within .05% CO and 6 ppm HC (use the larger of the two tolerances), then no adjustment of the analyzer is needed. For this check the span gas may be introduced either through the calibration port (if so equipped) or through the probe. This paragraph does not prevent those who wish to always adjust the analyzer to the exact span value from doing so.

(3) *Gas span adjustment.* If the analyzer fails to meet the gas span check specifications, then the analyzer shall be adjusted by the following procedures:

(i) For analyzers *without* a calibration port, perform a simple leak check (e.g., cap the probe). Repair any leaks before continuing with this procedure. Introduce the span gas through the probe for this adjustment.

(ii) For analyzers *with* a calibration port, introduce the span gas through the port for this adjustment.

(iii) Perform a zero adjustment and a flowing span gas adjustment. Iterate between span and zero, as necessary, to obtain stable readings within the gas span check specifications.

(iv) Check the electrical span *without* changing the zero or span adjustments set in step (iii). If the electrical span does not match the electrical span line or voltage level, locate the potentiometer that controls the relationship between the gas span and the electrical span. Adjust this control until the electrical span target is achieved.

(v) Following this procedure, if the gas span value cannot be held within the 2% tolerance (or .05% CO and 6 ppm HC) while also meeting the electrical span criteria, then the analysis system and calibration bottle shall be removed from service until the problem is resolved and the adjustment tolerance met.

(vi) Automatic analyzers that perform either a substantially similar adjustment procedure or mathematical correction procedure are considered to meet this adjustment procedure.

(4) *Span gases.* The span gas used for the weekly check shall be traceable to NBS standards ±2% and have concentrations either:

(i) Between the standards specified in this subpart and the jurisdiction's inspection standards for the 1981 model year light duty vehicles, or

(ii) Within −50% to +100% of the standards in this subpart.

(f) *Other checks.* In addition to performing span and leak checks on a periodic basis, these checks shall also be used to verify system performance under the following special circumstances.

(1) *Gas span check.* Within one week of the test, the analyzers must have been spanned using calibration gases which met the requirements in paragraph (e)(4) of this section and must not have been readjusted since to a non-conforming gas. If the analyzer reads the span gas within two percent of the span gas value or within .05 percent of the CO and 6 ppm HC (use the larger of the two tolerances), then no adjustment of the analyzer is needed. (However, adjusting the analyzer to the exact span value is not precluded.) For this check the span gas may be introduced either through the calibration port, if so equipped, or through the probe.

(2) *Leak checks.* Each time the sample line integrity is broken, a leak check shall be performed prior to testing. A simple vacuum leak check (i.e., block the probe and check for low flow) is considered acceptable for these nonperiodic checks.

[49 FR 24323, June 12, 1984. Redesignated and amended at 58 FR 58403, 58415, Nov. 1, 1993]

### § 85.2233 Steady state test equipment calibrations, adjustments, and quality control—EPA 91.

(a) *Special calendar and model year applicability.* The requirements of § 85.2232 apply concurrently for tests conducted under Emission Performance Warranty on 1995 and earlier model year vehicles or engines until December 31, 1993, after which the requirements of this section are solely in effect. The following exceptions apply: in a state

where the Administrator has approved a SIP revision providing for implementation of a basic centralized program meeting the requirements of part 51, subpart S of this chapter, according to the schedule specified in § 51.373 of this chapter, the requirements of § 85.2232 are concurrently in effect until June 30, 1994 for 1995 and earlier model year vehicles or engines; in a state where the Administrator has approved a SIP revision providing for implementation of an enhanced program meeting the requirements of part 51, subpart S of this chapter, according to the schedule specified in § 51.373 of this chapter, the requirements of § 85.2232 are concurrently in effect until December 31, 1995 for 1995 and earlier model year vehicles or engines.

(b) Equipment must be calibrated in accordance with the manufacturers' instructions.

(c) *Prior to each test*—(1) *Hydrocarbon hang-up check.* Immediately prior to each test the analyzer automatically performs a hydrocarbon hang-up check. If the HC reading, when the probe is sampling ambient air, exceeds 20 ppm, the system must be purged with clean air or zero gas. The analyzer must be inhibited from continuing the test until HC levels drop below 20 ppm.

(2) *Automatic zero and span.* The analyzer conducts an automatic zero and span check prior to each test. The span check must include the HC, CO, and CO2 channels and, if present, the NO channel. If zero and/or span drift cause the signal levels to move beyond the adjustment range of the analyzer, it must lock out from testing.

(3) *Low flow.* The system locks out from testing if the sample flow is below the acceptable level as defined in § 85.2225(c)(6).

(d) *Leak check.* A system leak check is performed within 24 hours before the test in low volume stations (those performing less than 4,000 inspections per year) and within four hours in high-volume stations (4,000 or more inspections per year) and may be performed in conjunction with the gas calibration described in paragraph (e)(1) of this section. If a leak check is not performed within the preceding 24 hours in low volume stations and within four hours in high-volume stations or if the analyzer fails the leak check, the analyzer must lock out from testing. The leak check must be a procedure demonstrated to effectively check the sample hose and probe for leaks and is performed in accordance with good engineering practices. An error of more than ±2 percent of the reading using low range span gas must cause the analyzer to lock out from testing, and requires repair of leaks.

(e) *Gas calibration.* (1) On each operating day in high-volume stations, analyzers must automatically require and successfully pass a two-point gas calibration for HC, CO, and CO2 and must continually compensate for changes in barometric pressure. Calibration must be checked within four hours before the test and the analyzer adjusted if the reading is more than two percent different from the span gas value. In low-volume stations, analyzers must undergo a two-point calibration within 72 hours before each test, unless changes in barometric pressure are compensated for automatically and statistical process control demonstrates equal or better quality control using different frequencies. Gas calibration is accomplished by introducing span gas that meets the requirements of paragraph (e)(3) of this section into the analyzer through the calibration port. No adjustment of the analyzer is necessary if the analyzer reads the span gas within the allowable tolerance range; that is, the square root of sum of the squares of the span gas tolerance (described in paragraph (e)(3) of this section) and the calibration tolerance (which is equal to two percent). The gas calibration procedure corrects readings that exceed the allowable tolerance range to the center of the allowable tolerance range. The pressure in the sample cell must be the same with the calibration gas flowing during calibration as with the sample gas flowing during sampling. If the system is not calibrated, or the system fails the calibration check, the analyzer must lock out from testing.

(2) *Span points.* A two-point gas calibration procedure must be followed. The span is accomplished at one of the pairs of span points listed in paragraphs (e)(2)(i) and (ii) of this section.

(i)(A) 300 ppm and 1200 ppm propane (HC).

(B) 1.0% and 4.0% carbon monoxide (CO).

(C) 6.0% and 12.0% carbon dioxide ($CO_2$).

(D) (if equipped for nitric oxide) 1000 ppm and 3000 ppm nitric oxide (NO).

(ii)(A) 0 ppm and 600 ppm propane (HC).

(B) 0.0% and 1.6% carbon monoxide (CO).

(C) 0.0% and 11.0% carbon dioxide ($CO_2$)

(D) (if equipped for nitric oxide) 0 ppm and 1200 ppm nitric oxide (NO).

(3) *Span gases.* The analyzed concentrations for the span gases used for calibration must be nominally within two percent of the span points specified in paragraph (d)(2) of this section and must be traceable to National Institute of Standards and Technology (NIST) standards within two percent. Zero gases must conform to the specifications given in § 86.114–79 (a)(5) of this chapter.

(f) *Dynamometer checks*—(1) *Monthly check.* Within one month preceding each loaded test, the accuracy of the roll speed indicator must be verified and the dynamometer must be checked for proper power absorber settings.

(2) *Semi-annual check.* Within six months preceding each loaded test as described in § 85.2217, the road-load response of the variable-curve dynamometer or the frictional power absorption of the dynamometer must be checked by a coast down procedure similar to that described in § 86.118–78 of this chapter. The check is done at 30 mph (48 kph), and a power absorption load setting to generate a power of 4.1 horsepower (or 3.057 kilowatts). The actual coast down time from 45 mph to 15 mph (72 kph to 24 kph) must be within +1 second of the time calculated by the equation in paragraph (f)(2)(i) of this section for English system units or paragraph (f)(2)(ii) of this section for SI units.

(i) $$\text{Coast Down Time} = \frac{0.10932 \times W}{P}$$

where W is the total inertia weight as represented by the weight of the rollers (excluding free rollers), and any inertia flywheels used, measured in pounds, and P is power, measured in horsepower. If the coast down time is not within the specified tolerance the dynamometer must be taken out of service and corrective action must be taken.

(ii) $$\text{Coast Down Time} = \frac{0.17978 \times W}{P}$$

where W is the total inertia weight as represented by the weight of the rollers (excluding free rollers), and any inertia flywheels used, measured in kilograms, and P is power, measured in kilowatts. If the coast down time is not within the specified tolerance the dynamometer must be taken out of service and corrective action must be taken.

(g) *Other checks.* In addition to the other periodic checks described in this section, those described in paragraphs (g)(1) and (2) of this section are also used to verify system performance under the special circumstances described therein.

(1) *Gas calibration.* (i) Each time the analyzer electronic or optical systems are repaired or replaced, a gas calibration is performed prior to returning the unit to service.

(ii) In high-volume stations, monthly multi-point calibrations are performed. Low-volume stations must perform multi-point calibrations every six months. The calibration curve is checked at 20 percent, 40 percent, 60 percent, and 80 percent of full scale, and must be adjusted or repaired if the specifications in § 85.2225(c)(1) are not met.

(2) *Leak checks.* Each time the sample line integrity is broken, a leak check is performed prior to testing.

[58 FR 58415, Nov. 1, 1993; 59 FR 33913, July 1, 1994]

### §§ 85.2234–85.2236 [Reserved]

### § 85.2237 Test report—EPA 81.

(a) *Applicability.* The requirements of this subsection apply to short tests conducted under Emissions Performance Warranty through December 31, 1993. The requirements of § 85.2238 apply concurrently until December 31, 1993, after which the requirements of